

In the Claims:

*Please cancel Claim 1*

- 1 2. (New) A method of soft decision decoding, the method comprising the steps of:
  - 2 a. receiving an input signal over a channel; and
  - 3 b. approximating a Log-Likelihood-Ratio result of the input signal, wherein
  - 4 the Log-Likelihood-Ratio result is independent of a signal to noise ratio
  - 5 value calculable over the channel.
- 1 3. (New) The method of soft decision decoding according to claim 2 wherein the  
2 step of approximating further comprises calculating an actual  
3 Log-Likelihood-Ratio value for each of a plurality of m bits per symbol  
4 contained in the input signal.
- 1 4. (New) The method of soft decision decoding according to claim 3 wherein the  
2 step of approximating further comprises separating the actual Log-  
3 Likelihood-Ratio values into one or more n-regions, wherein n is an  
4 integer.
- 1 5. (New) The method of soft decision decoding according to claim 4 wherein the  
2 step of approximating further comprises determining a constant,  $a_n$ , by  
3 computing a partial derivative for the actual Log-Likelihood-Ratio values  
4 in the one or more n-regions.
- 1 6. (New) The method of soft decision decoding according to claim 5 wherein the  
2 step of approximating further comprises determining a slope for the actual  
3 Log-Likelihood-Ratio value for each of the plurality of m bits per symbol.
- 1 7. (New) The method of soft decision decoding according to claim 6 wherein the  
2 slope is determined by use of a linear equation, wherein the linear equation  
3 utilizes the constant  $a_n$ .

1 8. (New) The method of soft decision decoding according to claim 6 wherein the  
2 step of approximating further comprises quantizing the slope for each m  
3 bit per symbol.

1 9. (New) The method of soft decision decoding according to claim 8 wherein the  
2 step of quantizing is performed using a quantizing equation  
3

4

$$\text{Quantize} = \left( \text{LLR} \frac{2^{\text{SOFT\_BITS}-1}}{q\text{LIMIT}} + 2^{\text{SOFT\_BITS}-1} \right)$$

5 wherein the SOFT\_BITS value and the qLIMIT value are dependent on the signal to  
6 noise ratio.

1 10. (New) A method of soft decision decoding over a channel, the method  
2 comprising the steps of:  
3 a. receiving an input signal over the channel, wherein the input signal has a  
4 plurality of m bits per symbol;  
5 b. calculating an actual Log-Likelihood-Ratio value for each of the plurality  
6 of m bits per symbol;  
7 c. determining a slope for the actual Log-Likelihood-Ratio value of each m  
8 bit; and  
9 d. quantizing the slope for each m bit per symbol and generating a  
10 Log-Likelihood-Ratio result, wherein the Log-Likelihood-Ratio value is  
11 independent of noise over the channel.

1 11. (New) The method of soft decision decoding according to claim 10 further  
2 comprising separating the actual Log-Likelihood-Ratio values into one or  
3 more n-regions, wherein n is an integer.

1 12. (New) The method of soft decision decoding according to claim 11 further  
2 comprising determining a constant  $a_n$  by computing a partial derivative for  
3 the actual Log-Likelihood-Ratio values in the one or more n-regions.

1 13. (New) The method of soft decision decoding according to claim 12 wherein the  
2 slope is determined by use of a linear equation, wherein the linear equation  
3 utilizes the constant  $a_n$ .

1 14. (New) The method of soft decision decoding according to claim 10 wherein the  
2 step of quantizing is performed using a quantizing equation

$$Quantize = \left( LLR \frac{2^{SOFT\_BITS-1}}{aLIMIT} + 2^{SOFT\_BITS-1} \right)$$

5 wherein the SOFT\_BITS value and the qLIMIT value are dependent on the signal to  
6 noise ratio.

1 15. (New) A method of soft decision decoding over a modulated channel wherein a  
2 signal to noise ratio may be calculated over the channel, the method comprising  
3 the steps of:

- a. receiving an input signal over the channel, wherein the input signal has a plurality of  $m$  bits per symbol;
- b. calculating an actual Log-Likelihood-Ratio value for each of the plurality of  $m$  bits per symbol, wherein the actual Log-Likelihood-Ratio value includes a SOFT\_BITS value for each of the plurality of  $m$  bits per symbol;
- c. separating the actual Log-Likelihood-Ratio values into one or more  $n$ -regions, wherein  $n$  is an integer;
- d. determining a constant,  $a_n$  by computing a partial derivative for the actual Log-Likelihood-Ratio values in the one or more  $n$ -regions;
- e. calculating a slope by use of a linear equation, wherein the linear equation utilizes the constant  $a_n$ ; and
- f. quantizing the constant  $a_n$  by utilizing the quantizing equation

$$Quantize = \left( LLR \frac{2^{SOFT\_BITS-1}}{qLIMIT} + 2^{SOFT\_BITS-1} \right)$$

1       wherein the SOFT\_BITS value and qLIMIT are dependent on the signal to noise ratio,  
2       the quantizing equation generating a quantized Logarithmic-Likelihood-Ratio result  
3       substantially independent of the signal to noise ratio over the channel.

1       16. (New) A Logarithmic Likelihood Ratio module for soft decision decoding over a  
2       modulated channel, the Logarithmic Likelihood Ratio module comprising:  
3           a. an input module for receiving a plurality of (I,Q) data symbols;  
4           b. a modulation unit for determining a modulation scheme for calculating a  
5           Logarithmic Likelihood Ratio result for the plurality of (I,Q) data symbols,  
6           wherein the Logarithmic Likelihood Ratio result is substantially  
7           independent of a signal to noise ratio over the modulated signal; and  
8           c. a converter module for converting the Logarithmic Likelihood Ratio result  
9           of the plurality of (I,Q) data symbols into unsigned values.

1       17. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2       comprising a gain module for amplifying the plurality of data symbols by a  
3       multiplicative factor.

1       18. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2       comprising a PSK module for calculating the Logarithmic Likelihood  
3       Ratio result by determining a slope of the plurality of (I,Q) data symbols in  
4       a phase shift key modulation scheme.

1       19. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2       comprising a QAM module for calculating the Logarithmic Likelihood  
3       Ratio result by a determining a slope of the plurality of (I,Q) data symbols  
4       over a quadrature amplitude modulation scheme.

1       20. (New) The Logarithmic Likelihood Ratio module according to claim 19 further  
2       comprising a second QAM module for calculating the Logarithmic  
3       Likelihood Ratio result for a portion of the m bits in parallel with the  
4       QAM module.

1 21. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2 comprising a multiplexer coupled to the modulation unit, wherein  
3 multiplexer provides the Logarithmic Likelihood Ratio result to the  
4 converter module.